

Presentation Type: Platform Preferred

Track: Integrated Environmental Assessment and Management

Session: Emerging Contaminants in the Marine Environment: Presence, Effects, Regulation

Abstract Title: Temporal trends and evidence of preservation of benzotriazoles in coastal sediments of the United States.

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Abstract

Benzotriazoles (BZTs) are used in a wide range of commercial and industrial applications as well as consumer products. There are several categories of usage of these compounds, the major two being as an additive to provide ultraviolet (UV) stabilization for plastics and films and as a metal corrosion inhibitor. Production of UV BZTs started in the early 1960s with increasing usage over time due to new product applications. Many BZTs exhibit behaviors characteristic of persistent organic pollutants with emerging evidence indicating long term preservation and persistence in sediments. Despite their use for decades, only recently have BZTs been recognized as emerging contaminants. Further, much more needs to be learned about them to understand BZT presence and distribution in the marine environment. In this study, dated sediment cores from two east coast estuaries (Salem Sound, MA and Narragansett Bay, RI) and one west coast deep water station (Palos Verdes shelf CA) were analyzed for six high production BZTs associated with UV applications. In the Narragansett Bay core, appearance of BZTs corresponds to patent dates and production records. A number of BZTs were present in the core at levels exceeding 100 mg/Kg, reflecting past local production of these compounds and their discharge to the environment. In Salem Sound, four commonly produced BZTs were present, ranging in concentration from below detection to more than 35 µg/Kg, reflecting trends that can be associated with local wastewater treatment plant upgrades. At the Palos Verdes site, two BZTs were present to the bottom of the core, which corresponds to approximately 1971. Levels at Palos Verdes were similar to those in the Salem Sound location. The observations from these cores suggest that BZTs are ubiquitous in coastal waters at elevated levels and are being preserved in marine sediments, generating concern for potential adverse ecological effects.